Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(NEW) EXAMINATION – SUMMER 2022

Subject Code:3151107 Date:04/06/2022

Subject Name:Advance Microcontroller

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is the advantage of barrel shifter in ARM?	**03**
	(b)	Why FIQ response is fast than IRQ response in ARM processor? Explain necessity of FIQ with one example.	**04**
	(c)	Explain difference between RISC and CISC architecture. Which RISC features are selected in ARM processor and which features are rejected in ARM processor?	**07**
Q.2	**(a)**	What are the special functions of R13, R14 and R15 registers?	**03**
	(b)	What is the purpose of CPSR and SPSR in ARM processor?	**04**
	(c)	Explain ARM7TDMI architecture and its programming model	**07**
		OR	
	(c)	Explain ARM 3 stage and 5 stage pipeline. If an instruction takes 3 cycles for execution, then how many cycles are needed for executing 4 instructions of the same type in a sequence using a 3-stage pipeline? Assume that there are no interrupts or exceptions while executing the instructions.	**07**
Q.3	**(a)**	Explain difference between Little endian & Big Endian with example	**03**
	(b)	What is default ARM exception priority? What will be effect of setting I and F bit?	**04**
	(c)	Explain following assembly language instructions: [a] LDMIA R0!,{R2-R6} [b] MVN R1,R4 [c] MOV R5,R6,LSL #2 [d] LDR R1,[R3] [e] RSC R0,R1,R2 [f] ADDEQ R0,R1,R2 [g] TST R1,R2	**07**
		OR	
Q.3	**(a)**	Explain difference between Harvard & Von-Neumann Architecture	**03**
	(b)	In ARM processor, content of register R1=0x7FFFFFFF and R2=0x00000001. What will be content of register R3 and status of flag V after execution of instruction ADDS R3,R1,R2 ?	**04**
	(c)	Draw interfacing diagram to interface LCD with ARM processor. Write Assembly or C program to display message “DIGITAL INDIA” on the LCD.	**07**
Q.4	**(a)**	Write initialization instruction in Embedded C language for ARM if we want to connect 4 push-button SW with P0.0 to P0.3, 8 LEDs with P0.4 to P0.11, Digital sensors with P0.12 to P0.15 and Actuators with P0.16 to P0.19 pins of ARM Chip.	**03**
	(b)	List ARM development tools and advantages of Embedded C Programming.	**04**

	(c)	What are the exceptions in ARM processor? Explain mode of operation for different exceptions	**07**

OR

Q.4	**(a)**	List I2C and SPI interface signals. Is it possible to connect multiple devices with I2C interface?	**03**
	(b)	What is cache memory? What is advantage of using cache memory? Explain concept of cache memory	**04**
	(c)	List optimization techniques of Embedded C Programming. Explain any three techniques in detail with examples.	**07**
Q.5	**(a)**	Discuss variable storage class: Automatic, Register and static.	**03**
	(b)	What is difference between Cortex A, Cortex M and Cortex R series of ARM?	**04**
	(c)	Design ARM based system to control solenoids S1, S2,S3 and S4. Write Embedded C program to operate solenoid in such a way that solenoid S1 and S3 should be ON for 5 second and then after solenoid S2 and S4 should be ON for 3 second and then after repeat the sequence continuously.	**07**

OR

Q.5	**(a)**	Justify the statement "Virtual memory is illusion of large main memory"	**03**
	(b)	What is AMBA? Why AMBA is popular in modern embedded system design?	**04**
	(c)	Design ARM system to generate two PWM signals to control devices. Write C program to generate PWM on any two PWM pins with duty cycle of 20% and 40% respectively.	**07**

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